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Microsphaeropsis caloplacae sp. nov. on *Caloplaca persica* in Turkey

Javier Etayo[1] & Kenan Yazici[2*]

jetayosa@aralar.pnte.cfnavarra.es
[1]Navarro Villoslada 16, 3º dcha, 31003 Pamplona, Navarra, Spain

**kcagri_1997@yahoo.com*
[2]Karadeniz Technical University, Faculty of Sciences and Arts
Biology Department, 61080, Trabzon–Turkey

Abstract — A new lichenicolous coelomycete, *Microsphaeropsis caloplacae,* is described from the apothecial discs of *Caloplaca persica* in Turkey.

Keywords — *Ascomycota,* lichens, lichenicolous fungus, taxonomy

Introduction

The diversity and distribution of lichenicolous fungi in Turkey is poorly known, particularly in comparison to that from other European countries (Diederich et al. 2007, Etayo 2008, Hawksworth 2003, Suija 2005a,b, Zhurbenko et al. 2008). Hafellner & John (2006) reported 63 lichenicolous fungal taxa in Turkey, thus stimulating interest in lichenicolous fungi so that an additional 63 species were subsequently described from the country (Candan & Halıcı 2008; Candan & Özdemir-Türk 2008; Halıcı 2008; Halıcı et al. 2008; Halıcı & Candan 2007; Halıcı & Hawksworth 2007, 2008; Yazıcı & Aslan 2006, 2007). Approximately 127 species of lichenicolous fungi have now been reported from Turkey (Candan & Özdemir-Türk 2008, Halıcı 2008a,b). Below we describe a new lichenicolous coelomycete species, *Microsphaeropsis caloplacae*, that infects the apothecial discs of *Caloplaca persica* (J. Steiner) M. Steiner & Poelt.

Material and methods

The fungus was studied using a Meiji zoom stereomicroscope and an Olympus CH microscope. Microscopical measurements were determined from hand-sectioned tissues examined in water. The material studied and collected by the authors is deposited in the herbarium of Biology Department, Karadeniz Technical University (KTUB).

Taxonomy

Microsphaeropsis caloplacae Etayo & Yazici, **sp. nov.** PLATE 1

MycoBank mb 512687

Fungus lichenicola in thallo et apotheciis Caloplacae persicae *crescens. Conidiomata pycnidia, singularia, pyriformia vel subglobosa, immersa, nigra, ostiolata, 30–50 µm in diam. Paries fuscus, c. 5 µm crassus et textura angularis. Conidia late ellipsoidea, brunnea, laevia, 7.2–8.3 × 4–6 µm.*

Holotype: Turkey, Sivas, Center, along the Kızılırmak river, 39°43'35" N, 37°02'24" E, alt. 1300 m, on the apothecial discs of *Caloplaca persica* on *Populus* sp., 17 August 2006, Yazici 0.1550 (KTUB–Biology Department, Faculty of Sciences and Arts, Karadeniz Technical University–***holotypus,*** , hb. Etayo-***isotypus***).

Etymology: The epithet "*caloplacae*" refers to the host species

Description: Pycnidia completely immersed in the apothecial discs of the host lichen, single, punctiform, hardly visible, blackish in surface view, pyriform to subglobose, 30–50 µm diam., ostiolate, without a distinctly thickened ostiolar collar; superficial and internal mycelium absent. Pycnidial wall c. 5 µm thick, composed of one layer of brown, paraplechtenchymatic cells of 4–7 µm in diam., almost hyaline in the basal part. Conidiophores absent. Conidiogenous cells rarely observed, apparently lining the inside of the pycnidial cavity, hyaline, broadly ampulliform and applanate, 4–7 µm wide. Conidia filling the pycnidial cavity, enteroblastic, arising singly, not catenate, broadly ellipsoid with some vertical constrictions, aseptate, young walls hyaline but soon brown, smooth and easily broken by pressure, rounded at both ends, without basal scar, 7.2–8.3 × 4–6 µm, length/breadth ratio 1.2–1.8 (n=30).

Distribution and habitat - The new species is known only from the type locality. Although the apothecial disc of *Caloplaca persica* is darkened by the presence of the lichenicolous fungus, the hymenium goes on producing ascospores normally, and therefore the infection seems not to be strongly pathogenic. The darkening of the parasitized apothecia is due not only to the pycnidia but also to the ascospores of the fungus and hyphae produced by spore germination. Living with *M. caloplacae* in the type locality is a *Lichenodiplis* species with spores similar to *L. lichenicola* Dyko & D.Hawksw. in size.

Ecology of the survey area – The type locality, Sivas, has a continental climate with hot and dry summer seasons and cold, rainy, snowy and windy winters. Steppe vegetation dominates plateaus and hills. The well-lit site, which is occasionally exposed to strong winds in winter, has an elevation of 1300 m and lies 50 m from the Kızılırmak River. *Acer*, *Populus* and *Pyrus* trees are occasionally present along the Kızılırmak River. Temperatures range from –34.6° C in winter to +38.3° C in summer. The atmospheric humidity varies between 55 and 80 %. The mean annual rainfall is 420 mm (Akman 1999).

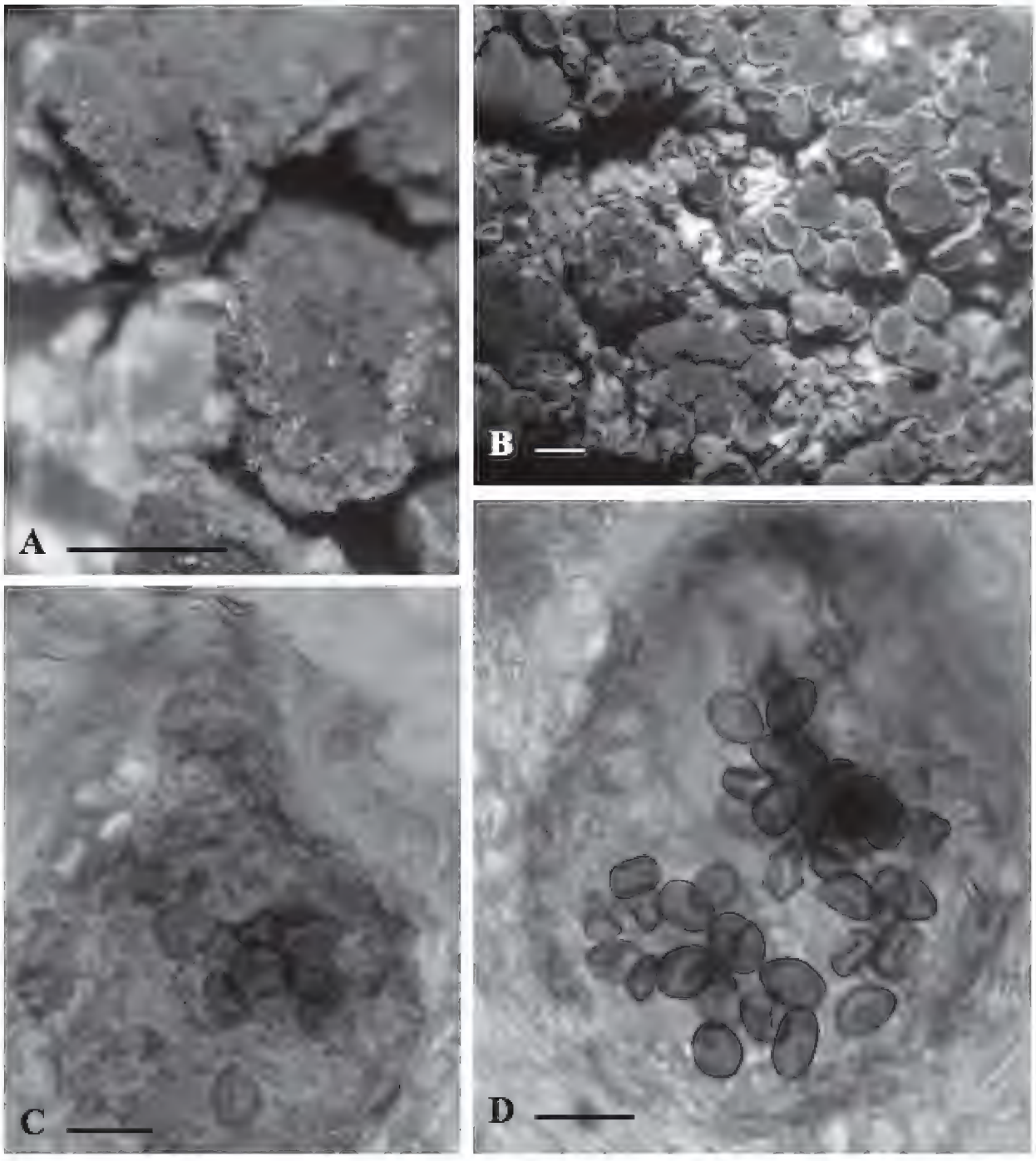

Plate 1. A: Apothecia of *Caloplaca persica* infected by *Microsphaeropsis caloplacae*. B: Comparison of infected apothecia (left, darkened) and uninfected apothecia (right). C–D: *M. caloplacae* pycnidia completely immersed in the host apothecia. C: Apical papilla (top) comprises one row of cells concolorous with the pycnidial wall. D: Darkened conidia within the pycnidial cavity.
Scale bars: A, B = 0.5 mm; C, D = 10 μm.

Discussion

The new species is placed with some hesitation into the coelomycete genus *Microsphaeropsis* Höhn., a genus that normally infects plant leaves. In the studied material it was not possible to observe well developed conidiogenous cells, although several structures similar to such cells (but more applanate than) seem to exist in *Microsphaeropsis*. As the other features do not fit with any of

the known lichenicolous coelomycetes, we decided to refer the new species provisionally to this genus. Another lichenicolous species, *Microsphaeropsis lichenicola* Etayo, growing on several species of macrolichens (*Hypotrachyna*, *Nephroma*, *Pannaria*) in southern Chile, has recently been described (Etayo & Sancho 2008). Besides the different hosts, that taxon has larger (c. 100 µm diam.) pycnidia and thicker pycnidia (8–10 µm) and cell (5–12 µm) walls.

A similar lichenicolous species has recently been described as *Acaroconium punctiforme* Kocourk. & D. Hawksw. (Kocourková & Hawksworth 2008). This genus is said to be distinguished from *Microsphaeropsis* by possession of a differentiated ostiolar collar and broadly ellipsoid to somewhat irregular conidia. Although we think that both characters, and especially the last one, are not sufficient to differentiate between two genera, further studies are needed to determine whether *Acaroconium* and *Microsphaeropsis* represent one genus. Seephonkal et al. (2002) were able to isolate the type species of *Microsphaeropsis*, *M. olivacea* (Bonord.) Höhn., which is common on twigs and branches of various trees, from the lichen *Dirinaria applanata* in Thailand. This species has much larger (200–240 × 160–200 µm) pycnidia and smaller, narrower (5.5–6.5 × 3.2–3.4 µm) conidia (Hoog et al. 2000) than *M. caloplacae*. The similar genus *Phoma* Sacc. (1880), which also includes several lichenicolous species, differs primarily in having hyaline conidia and with most species inhabiting phanerogams (Hawksworth 1981, Hawksworth & Cole 2004).

Acaroconium punctiforme differs from our new species in pycnidial size (50–100 µm diam.), the absence of a thicker ostiolar collar at the pycnidial apex, and the irregularly shaped, ellipsoid conidia (see FIG. 1D in Kocourková & Hawksworth 2008).

Key to *Acaroconium* and *Microsphaeropsis* lichenicolous species

1. Conidioma large, 200–240 × 160–200 µm [conidia 5.5–6.5 × 3.2–3.4 µm, saprobic on several substrates, including *Dirinaria*] ..... ***Microsphaeropsis olivacea*** (Bonord.) Höhn.
1. Conidioma smaller, ≤ 150 µm 2
2. Conidioma (50–100 µm diam.) with ostiolar collar, conidia irregular to ellipsoid, 5.5–7.5× 3.5–5 µm. On *Acarospora* and *Sarcogyne* ..... ***Acaroconium punctiforme*** Kocourk. & D. Hawksw.
2. Conidioma (30–100 µm diam.) without ostiolar collar, conidia regular. Not on *Acarospora* or *Sarcogyne* 3
3. Conidioma ~100 µm diam., conidia ~6–7 × 4–5 µm (ellipsoid), on foliaceous austral lichens, e.g., *Hypotrachyna, Nephroma*, *Pannaria* ..... ***Microsphaeropsis lichenicola*** Etayo
3. Conidioma smaller (30–50 µm diam.), conidia larger (7.2–8.3 × 4–6 µm), on apothecial discs of *Caloplaca* ..... ***Microsphaeropsis caloplacae***

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